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ABSTRACT

This monograph notes the dichotomy between doctoral education and preparation for various kinds of jobs or careers, arguing that while doctoral education prepares people to do independent research, employers by and large are seeking other skills. This paper attempts to examine the role of graduate education through a variety of lenses--e.g., as preparation for a career in research, preparation for scholarship, for faculty positions, for industrial positions, for professional practice, for other positions, and for life. It sees preparation for research as a vehicle for preparing scholars, and it defines scholarship as seeing one's research within a larger framework of intellectual work. In considering preparation for faculty positions the paper notes that more attention must be placed on training teaching assistants for the full range of faculty work. And for industrial careers, it argues for programs analogous to internships in teaching hospitals. In advocating preparation for life, the paper asks how far graduate programs should go to prepare students for life, and suggests workshops and seminars to provide practical skills in areas such as preparing resumes, time management, and working in teams. Finally, the paper offers some examples of approaches being tried on various campuses to broaden graduate education. (Contains 20 references.) (CH)

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Jules B. LaPidus, President
Council of Graduate Schools

* *Prepare v.-tr. To make ready beforehand for some purpose. -intr. To get ready.*

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Virtually all discussions of graduate education involve the idea of preparing students for some kind of professional activity, that is, for jobs and careers in which they use the knowledge and skills that were the focus of their graduate education. For the most part, however, Ph.D.s are prepared to do certain things, but not for work in any particular sector. Preparation for jobs or careers, in the sense of particular and specific training, occurs rarely. This is quite different for most masters programs, where the needs of the profession shape the majority of programs, and students are specifically prepared for professional practice.

Special Edition

Doctoral education really attempts to prepare people to become scholars in a host of fields and disciplines. This is entirely consistent with the idea of the research university as a place where students and faculty seek knowledge together. It probably is true that, particularly in the most prestigious departments, there is a strong bias toward academic careers, specifically in research-intensive universities. But even in these cases, the only preparation for these academic careers is likely to be training in research. Indeed, in other countries with a tradition of doctoral education directed almost entirely to the preparation of faculty, the only requirement for postgraduate students is that they demonstrate the ability to do independent research.

The ability to successfully carry out an independent research project has long been thought of as the primary, and perhaps the sole criterion for obtaining a Ph.D. With few exceptions, however, employers of Ph.D.s assert that this is not the only thing they are looking for, and that opportunities to function as an independent investigator are increasingly limited. In an interview in 1994, Bruce Alberts, president of the National Academy of Sciences, was asked if we should be producing fewer Ph.D.s. His answer was "...if we're going to train with a very narrow Ph.D. that's really designed for people to be independent investigators, then we shouldn't be training so many" (Alberts, 1994). Similarly, in a government paper on science produced in England in 1993 the following statement appears: "The government is concerned that the traditional Ph.D. does not always match up to the needs of a career outside research in academia or in an industrial research laboratory. A minority of those studying for a Ph.D. in science, mathematics and engineering can realistically expect a long-term career in university research. The majority will move into other fields" (Chancellor of the Duchy of Lancaster, 1993).

Taken at its most elementary level, what I have described above has all the elements of a classic mismatch, with the universities producing a highly specialized product that the employers don't want. That clearly is not the case. Academia and industry are still attracted to candidates with outstanding research credentials. Prospective employers still ask candidates to present research seminars describing their dissertation projects. But they are beginning to ask for more.

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Increasingly, candidates for academic employment are being asked about their teaching experience and about their views on education, and some institutions (particularly liberal arts colleges or community colleges) may ask candidates to present a lecture rather than give a research seminar. Likewise, industrial employers may try to elicit a broader view of a candidates' research training, particularly as it relates to the interests of the company, than can be expressed by just examining the dissertation topic. These expectations of potential employers, coupled with constrictions in the traditional job market for Ph.D.s, translate rather quickly into student interest in a broader approach to graduate education. This has been encouraged by reports like *Reshaping the Graduate Education of Scientists and Engineers* (COSEPUP, 1995), that recommends modifications, primarily in doctoral education in the sciences and engineering, that will give students this kind of preparation.

Students and graduate faculty members are broadening their definitions of goals and careers, and trying to understand the role of graduate education in:

Preparation for research
Preparation for scholarship
Preparation for faculty positions
Preparation for industrial positions
Preparation for professional practice
Preparation for other positions
Preparation for life

My purpose here is to describe what is meant in each case, and then to briefly discuss a variety of approaches currently in place or being considered by universities in the United States and several other countries.

Preparation for Research

American graduate schools are very good at preparing students for research, clearly among the best, if not the best in the world. There is not always agreement about motives or context. Is the product the research result or the researcher? Are the graduate students there to help the faculty with their research, or is it the other way round? The answer, at least in the U.S., is yes to all of the above. We have prided ourselves on the ability to produce research and researchers as part of the same process. To do that, we have developed a system that involves coursework coupled with doing research under the supervision of an established researcher. Until recently, this has been a uniquely American idea. Students truly are prepared to do research in their area of specialization. They are required to demonstrate that they know the literature and the techniques, and furthermore, that they understand how to solve problems in their fields. Several other countries are adopting or adapting this approach, and developing coursework components in what were formerly research-only programs.

But the research experience has to extend beyond mere technical training. This has been expressed most clearly by John Ziman (1968): "To be a member of a team directed by a distant and very busy leader, building just one technical link in a complicated experiment, is an inadequate apprenticeship to the art; it is as if the pupils of Rubens were to be accounted artists after five years of painting-in the buttons on his larger compositions. High technical standards may be achieved by the student, without a grasp of the deeper intellectual issues."

Similarly, Boyer (1990), observed that, "Surely, scholarship means engaging in original research. But the work of the scholar also means stepping back from one's investigation, looking for connections, building bridges between theory and practice, and communicating one's knowledge effectively to students."

The point here is that graduate education must be more than a simple apprenticeship, and that research, in this context, must be more than a technical exercise for producing research results. It must be a vehicle for preparing scholars.

Preparation for Scholarship

Scientists often seem uncomfortable with this word, which usually is associated with the humanities, and somehow doesn't seem as rigorous as research. There is relatively little use of the term in science programs,

perhaps because scientists may believe that the term "scientist" subsumes the term "scholar." Realistically, most Ph.D.s probably are what has been described as "operationally creative," that is, they have the kind of research training described above, and are very good at doing work and solving problems in their fields. Trying to make students more scholarly, more aware of the implications of their work and how it fits into a bigger and more complex pattern, is much more difficult than teaching them how to carry out a procedure and interpret the results. It usually is accomplished informally, through interactions with colleagues, through seminars, and, rarely, through specific actions. I have suggested elsewhere (LaPidus, 1996) that research and scholarship may be related in much the same way as information and knowledge, and that if research is what you do, scholarship is the way you think about it. It is this broader view, this placing of one's research not just in the context of the discipline, but in a larger framework of intellectual work, that distinguishes good graduate education from advanced training programs.

PREPARATION FOR JOBS AND CAREERS

In considering preparation for jobs and/or careers, the component usually left out in discussions of the topic is the responsibility of the employer. Many, if not most employers understand that graduate education does not produce completely formed professionals, ready to make a full contribution from the first day on the job. Good graduate programs produce people who are prepared to become faculty members or industrial researchers or practicing professionals in a host of fields. They have acquired knowledge and skills that make them well-suited for a variety of different positions, but they may need to be assisted in adapting to those positions. Possibilities exist for fruitful cooperation between the consumers and producers of recent graduates, and attention should be paid to the period comprising the last two years of graduate school and the first two years on the job. Regardless of the type of employment—academic, industrial, or other—the challenge is to make the transition smoother and more productive.

PREPARATION FOR FACULTY POSITIONS

Usually this is stated as preparation for teaching, but that is far too restricted a view of the faculty role. Faculty members do a lot more than teach. The new faculty member faces a daunting number of responsibilities. Those listed here represent the range of activities routinely carried out by faculty members at various times during their academic careers:

- teaching advanced courses
- doing research
- getting financial support for research
- writing and publishing articles in the scholarly literature
- directing graduate student research
- getting financial support for graduate students
- advising and mentoring graduate students
- teaching courses in professional programs
- teaching undergraduate courses
- writing textbooks
- advising and mentoring undergraduates
- participating in academic, administrative and service responsibilities
- bringing your scholarship (that is, your ability to identify the important questions and suggest ways to find answers) to bear on all of the above.

Historically there has been little, if any, "preparation" for any of these activities except research. In fact, for the most part, they are not even discussed. Being a teaching assistant (TA) provides some exposure to teaching, but the TA experience is often confined to lower level courses, and in any case, has not usually been thought of in terms of faculty preparation. During the past ten years, universities have been paying much more attention to the training of TA's, and a series of bi-annual conferences on TA training and responsibilities has attracted hundreds of faculty members, administrators, and graduate students. But being a teaching assistant is only part of the preparation for faculty roles.

As an approach to improving this situation, a number of universities have developed programs to introduce graduate students to the full range of faculty life. The Preparing Future Faculty (PFF) program, administered by the Council of Graduate Schools and Association of American Colleges and Universities with funding from The Pew Charitable Trusts, is perhaps the most extensive of these. Fifteen clusters have been formed, each comprising a research university, and a diverse group of institutions such as a comprehensive university, a four year liberal arts college, and a community college, all close enough geographically so that students can move easily among them. Doctoral students participate, on a discipline basis, in faculty activities in all four types of institutions. This program deals with the realities of being a faculty member in the variety of settings that constitute the academic job market. Variations of this kind of program exist at dozens of universities.

Preparation for Industrial Careers

This has been much less structured than preparation for faculty careers, and obviously applies primarily to the sciences and engineering. A number of institutions, in collaboration with industrial partners, have developed internships for doctoral and in some cases, postdoctoral candidates. In 1974, the Teaching Company Scheme was initiated in Great Britain. This has mainly involved engineering students but has been expanding to include other fields. The term Teaching Company is analogous to Teaching Hospital, that is, a place where students can experience the research issues, as well as the culture, characteristic of a particular kind of setting. This may be a useful model to explore.

It is not unusual for science and engineering departments to develop industrial advisory groups. These involve researchers and research administrators from companies with interests in the research being carried out in the department, and in the students being trained. They may meet on a regular basis with faculty and graduate students to discuss mutual research interests, and to cultivate graduate students who may be future employees. These advisory groups provide some exposure to industrial research problems, but little to industrial research culture. Combined with industrial internships, they may be of great value to graduate students interested in industrial careers. For example, the University of Wisconsin-Madison, has developed a biotechnology training program that involves a six-month industrial internship for graduate students.

During the past few years, there has been increasing interest in reshaping the masters degree in the sciences to serve as a useful credential, particularly for industrial employment. This has been quite successful in Japan (Normile, 1996), and has been urged in the United States in the COSEPUP report and also by Tobias and Chubin (1996). Along these lines, a masters degree in biotechnology was established in the mid 1990's at Northwestern University. This program is fundamentally different from a Ph.D. and is not preparation for that degree. Building on a core of courses in biotechnology, students from a variety of backgrounds (biology, engineering, chemistry, economics, business, etc.) customize programs that may include business, engineering, and medical science components. The program is intended to prepare people for work in the biotechnology industry, and even at this early date, appears to be successful.

Preparation for Professional Practice

This usually refers to practice-oriented masters and doctoral programs in fields like business, education, engineering, psychology, and a host of other professional fields. Characteristically, the design of these programs is closely related to the current state of practice. Practitioners often serve as adjuncts to program faculty, and internships, residencies, and related professional experiences are the norm, either during, prior to, or immediately after completion of the graduate program.

Post-baccalaureate certificate programs, that is, non-degree programs comprising courses and/or other experiences designed to provide students with certain specific kinds of skills related to current or prospective jobs, is a rapidly growing, but poorly defined area of graduate education. Certificates are offered by many kinds of organizations, including universities,

companies, and professional societies, for varying time periods, and with different objectives. Sometimes these programs are designed to meet the needs of specific employers, or to satisfy continuing education requirements. Many deal primarily with professional updating, and provide information and technical training. They may be ideally suited for programming in electronic formats such as the Internet, compressed TV, or video cassette courseware.

Post-baccalaureate education in the professional practice area, usually at the certificate or masters level, represents the most intense and extensive university interaction with the business, industrial, and professional communities. Many universities are paying increasing attention to this part of graduate education, and are finding new and useful ways of meeting the educational needs of the public that supports them.

Preparation for Other Jobs

We know that people with graduate degrees find their way into a wide variety of jobs and careers, some by choice, some by chance, and some by default. The further away from their specific training, the greater the use of their general education, particularly the scholarly process. John Armstrong, in a perceptive article titled, "Rethinking the Ph.D." (1994), stated what I believe to be the essence of the issue: "The training of new Ph.D.s is too narrow, too campus-centered, and too long. Furthermore, many new Ph.D.s have much too narrow a set of personal and career expectations. Most do not know what it is they know that is of most value. They think that what they know is how to solve certain highly technical and specialized problems....Of course, what they really know is how to formulate questions and partially answer them, starting from powerful and fundamental points of view."

The question then is—how do students discover "what they really know"? It may be that graduate educators have to become more explicit about it, rather than to hope it occurs by chance.

Preparation for Life

How far can or should graduate programs go in preparing students for life? Beyond ensuring that they know and can function competently in their fields, have some broader concept of scholarship that extends beyond those fields, and recognize the ethical responsibilities inherent in research and teaching, what else can graduate schools do that makes sense and helps students? The COSEPUP report and various other studies have made a number of reasonable suggestions, most of which come down to providing better information about jobs, careers, options, and safety nets. In some places, special seminars and/or workshops have been organized to provide information on topics like preparing resumes, communication and presentation skills, time management, and working in teams. Former graduates may be brought back to describe their careers and give advice. The list could be endless. At some point, each program, through open and realistic discussions involving students, faculty, potential employers, and perhaps alumni, will have to develop ideas about what will provide the best graduate education.

APPROACHES TO CHANGE IN GRADUATION EDUCATION

Several qualitatively different approaches are being suggested for improving the education of graduate students. Brief descriptions of a number of these (collected as part of a response to the COSEPUP report, and all in science and engineering) appear on the website of the Association of Graduate Schools of the Association of American Universities <http://www-ags.ucsd.edu/ags.html>, and some will be used as examples in the following discussion. Generally speaking, these approaches fall into several well defined categories:

A. Universities are trying to provide better information about jobs and the job market.

Given the uncertainties in predicting or projecting what the job market will be when current students graduate, they need to be made aware that there are no guarantees, and that their graduate education is applicable to a wide variety of career options. Career services and career development offices usually have been geared to the needs of undergraduate students. Brown, Cal Tech, Princeton, Michigan, and the University of Pennsylvania are among those that have developed specialized services of this type of graduate students.

B. Seminars or workshops on the relationship of graduate education to particular fields, and on how graduate education relates to work, are being offered or developed at some universities. Among these are Emory, Rutgers, Ohio State, University of California at Berkeley, and Vanderbilt. Former graduates or other individuals involved in academic and non-academic careers may talk about their careers and the role graduate education played in their lives. The University of Alabama at Birmingham has developed a workshop on career development for the life sciences that addresses both academic and non-academic careers, as well as a monthly forum called "The Industry Roundtable" that brings in outside speakers to discuss non-academic or unusual kinds of careers.

The University of Manchester Institute of Technology initiated the Graduate Support Program (Grasp) in 1994. (Thompson, 1997). First year Ph.D. students are exposed to lectures on topics like project planning, time management, report writing, ethics, presentation skills, communication skills, leadership and teamwork, managing stress, and product design and development. Final year doctoral students attend classes on job-hunting skills, CV writing, job interviews, and industrial structures and organizations. Similar programs are being carried out through the School of Research Studies at the University of Hong Kong, and at the University of Pittsburgh.

C. A number of universities are considering program modifications that will add more academic content. Here, several different approaches prevail:

1. Develop minors or collections of courses (certificates?) in closely related areas, e.g. molecular biology for organic chemists—economics for political scientists—computer science for physicists. The idea is to broaden the scope, but stay close to the students major field of study. The student would still plan to work in the primary area of interest, but would have "added on" related skills. For example, Brown University has added an option for a second master's degree in a field related to the doctoral field, and Tulane is encouraging physics and astronomy students to take elective courses in computer science, engineering, or finance.

2. Develop area studies options (perhaps as certificate programs) in very broad but related areas, e.g., environmental studies, or medieval studies, or polar studies. In the social sciences, students have been doing this for years. For example, economists with special interests in Asia might take a certificate program in East Asian Studies. The idea is to retain your expertise, but to relate it to a certain context or area of interest. The University of Colorado at Boulder has added interdisciplinary certificate programs in fields such as environmental policy and telecommunications, and the University of Iowa is offering a certificate in aging studies.

3. Develop courses, masters or certificate programs in presumably unrelated areas, e.g. business, journalism, public health, education. In this case, the student is

developing options that utilize the primary area as it applies to something else—sales, writing, K-12 teaching, etc. Several institutions—Penn State, Nebraska, Florida—are offering combined or dual degree programs involving an MBA coupled with either a Ph.D. or a master's degree. Cornell and others have developed 12 month MBA programs for scientists interested in business careers. Washington University and Wayne State have developed options whereby doctoral students can become certified to teach in the primary and secondary schools.

4. Develop programs similar to the Mres (Master of Research) degree recently initiated in the United Kingdom. Students from different disciplines are brought together to discuss and dissect research in a number of fields. The point is to illustrate the process of defining relevant questions and finding answers that is the basis for scholarly research in all fields. This kind of approach also emphasizes multidisciplinary aspects of problem solving. It is particularly useful for new graduate students. A modification of the Mres approach would be to have all graduate students participate in a research seminar that is multidisciplinary (not just in science and engineering, but including humanists, etc.). Real world problems—global, national, local, etc. would be discussed, and students might work in groups, and/or react to speakers. The emphasis would be on scholarly approaches to evaluating evidence, posing questions and suggesting ways to find answers. Along these lines, the University of Iowa has recently introduced a certificate program in The Rhetoric of Inquiry.

Any or all of these suggestions may be appropriate for individual programs, departments, or universities. They may be parts of other, quite different, approaches, such as the comprehensive changes recently initiated at Washington University (Magner, 1997). In this case, through the leadership of the Graduate School, the institution has decreased graduate enrollment (primarily to improve faculty-student ratios), provided assured multi-year support for graduate students, and instituted other changes designed to improve the entire process of graduate education.

CONCLUSION

All of these suggestions are reasonable. Some have been in place for years, some are now being considered, and some have recently been instituted. All suffer from the same drawback—they take time and increase the workload for students and faculty alike. Many people believe that such changes will increase the time it takes for students to earn their degrees. Actually, the most important variables related to that issue are probably adequate financial support, realistic dissertation requirements, and effective mentoring. (Bowen and Rudenstine, 1992; Council of Graduate Schools, 1991). Compared to these, the program modifications suggested here will have relatively little effect on time-to-degree, and may lead to increased completion rates as well as improvement in the quality of graduate education and the career prospects of students.

Graduate schools have a unique role to play in facilitating the kinds of change discussed here. As has been pointed out repeatedly (Bowen and Rudenstine, 1992; Geiger,1997), the departments are the dominant factors in graduate education, particularly at the doctoral level. In order for any change to be effective, it must have the support and involvement of the program faculty. But universities have to be more than collections of isolated departments. Graduate education, viewed in the broadest perspective, transcends departments and disciplines in that the assumptions upon which it is based have more to do with the level of education than with the particular subject area in question. Whether it be chemistry or classics, the kinds of program modifications now being considered can be effective in improving the graduate educational experience of students and faculty alike.

Unfortunately, it is all too easy for departments or programs to become isolated to the point where they are not aware of good ideas from elsewhere that could be adapted to their own use, and are unable to share their good ideas with others. This is often true even within broad areas like the sciences or the humanities, and is almost always true across these disciplinary boundaries. Graduate schools serve to create the linkages, to open the system, and to focus the attention of the graduate faculty on the education of graduate students. Through discussion of the issues in graduate councils, institutional policies can be developed which facilitate actions at the department or program level, all within the context of a shared vision of good graduate education.

We have moved a long way from the one student, one professor, one research project concept of doctoral education, and are beginning to understand that graduate education should be designed to prepare students for a variety of roles and responsibilities. This does not involve simply adding on components; it requires examination of the basic purpose and goals of doctoral education. The COSEPUP report mentioned earlier, as well as several other recent books and papers (Tobias, Chubin, and Aylesworth, 1995; Conrad, Haworth, and Milar, 1993; Geiger, 1997; Haworth, 1996), and projects like Preparing Future Faculty, have pointed the way to a broader and more realistic view of graduate education, one that is consistent not only with the size and scope of the current enterprise, but with the state of education, work, society, and scholarship as we prepare to enter the 21st century.

Graduate students need to understand that today's job market doesn't tell us much about tomorrow, just as yesterday's didn't tell us much about today. Students should keep their eyes and ears, their minds, and their options open. The best advice for faculty members is this: In order to help students prepare for a variety of possible careers, don't train them too specifically for any one. Instead, provide the kind of education that enables them to know their fields, understand the processes of scholarly inquiry, and a realistic picture of how they can use these highly valuable skills in a variety of ways, in a settings, and in a variety of satisfying and

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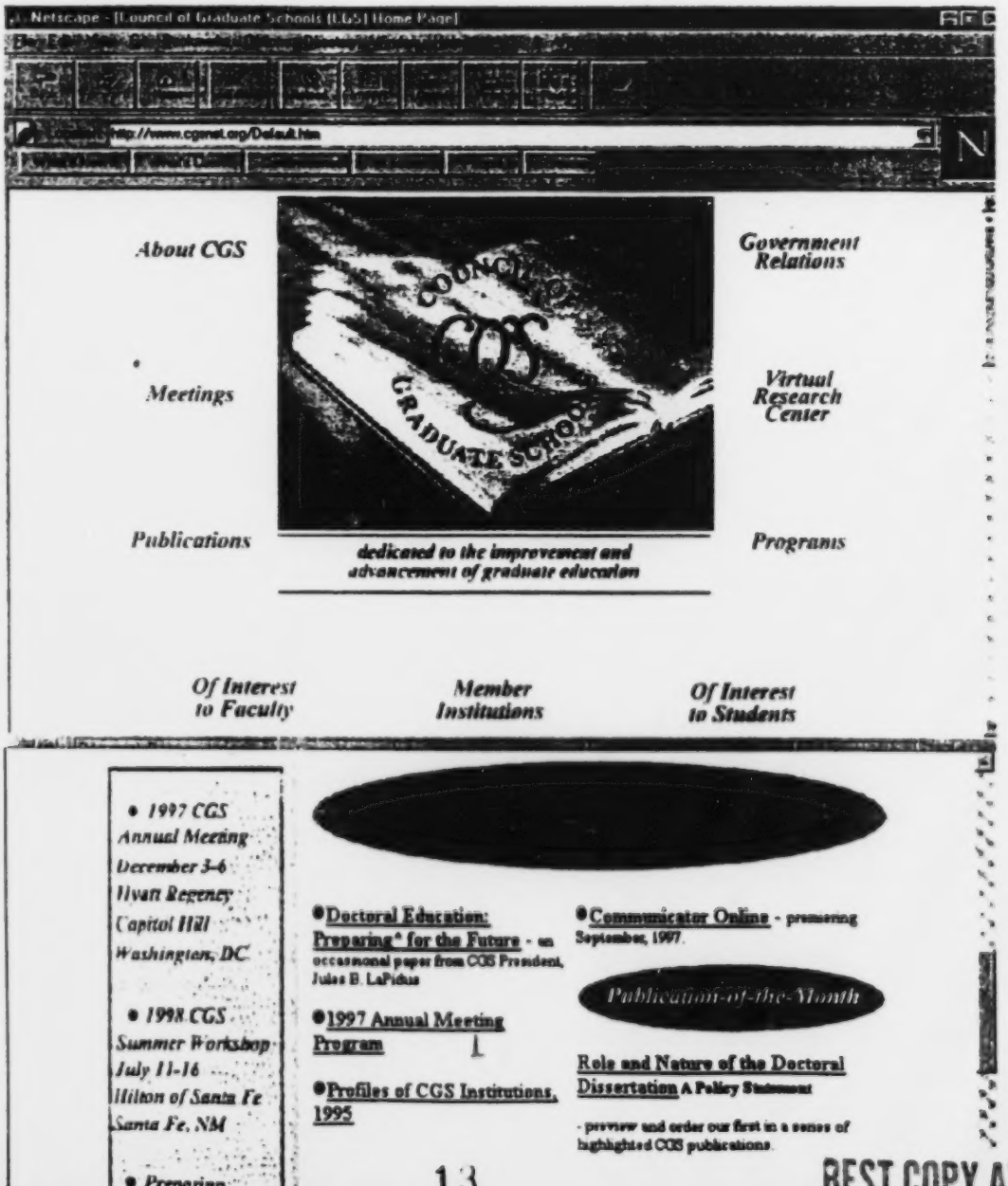
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Register by November 21 to receive regular registration fees. After November 21st on-site fees will apply.

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QUESTIONS? Contact the CGS Meeting Coordinator at mwynn@cgs.nche.edu

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